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Conference Abstract

Virtual Laboratories for Biodiversity Modelling: An Australian perspective

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Abstract

Recent technologies have enabled consistent and continuous collection of ecological data at high resolutions across large spatial scales. The challenge remains, however, to bring these data together and expose them to methods and tools to analyse the interaction between biodiversity and the environment. These challenges are mostly associated with the accessibility, visibility and interoperability of data, and the technical computation needed to interpret the data. Australia has invested in digital research infrastructures through the National Collaborative Research Infrastructure Strategy (NCRIS).

Here we present two platforms that provide easy access to global biodiversity, climate and environmental datasets integrated with a suite of analytical tools and linked to high-performance cloud computing infrastructure. The Biodiversity and Climate Change Virtual Laboratory (BCCVL) is a point-and-click online platform for modelling species responses to environmental conditions, which provides an easy introduction into the scientific concepts of models without the need for the user to understand the underlying code. For ecologists who write their own modelling scripts, we have developed ecocloud: a new online environment that provides access to data connected with command-line analysis tools like RStudio and Jupyter Notebooks as well as a virtual desktop environment using Australia's national cloud computing infrastructure. *ecocloud* is built through collaborations among key facilities within the ecosciences domain, establishing a collective long-term vision of creating an ecosystem of infrastructure that provides the capability to enable reliable prediction of future environmental outcomes. Underpinning these tools is an innovative

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training program, ecoEd, which provides cohesive training and skill development to enhance the translation of Australia's digital research infrastructures to the ecoscience community by educating and upskilling the next generation of environmental scientists and managers. Both of these platforms are built using a best-practice microservice model that allows for complete flexibility, scalability and stability in a cloud environment.

Both the BCCVL and *ecocloud* are open-source developments and provide opportunities for interoperability with other platforms (e.g. Atlas of Living Austalia). In Australia, the same technical infrastructure is also used for a platform for the humanities and social science domain, indicating that the underlying technologies are not domain specific. We therefore welcome collaborations with other organisations to further develop these platforms for the wider bio- and ecoinformatics community.

This presentation will showcase the tools, services, and underpinning infrastructure alongside our training and engagement framework as an exemplar in building platforms for next generation biodiversity science.

Keywords

biodiversity, modelling, species distribution modelling, climate change, platform, Australia

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